Alberts Water & Wastewater Services
Rural, Private, Municipal and Industrial
Water and Wastewater Systems Consultation Services
PMB #275
305 W. Magnolia St • Fort Collins, CO 80521
(970)494-1610 • Fax (970)494-1611

April 7, 2003

Colorado Division of Wildlife
6060 Broadway
Denver, CO 80216
Attn: Dave McKelvie

Re: Wildlife Health Laboratory Septic System
Microscopic Examination, Lab Analysis and Comments for Samples Dated April 1 and 10, 2003

General Discussion

Septic tanks are used mainly for treating the wastewater from individual homes or from small populations where sewers have not been provided. They operate on the principal of anaerobic (without oxygen) digestion. The system consists of a tank with a capacity of 500 to 3000 gallons and a piping array called a leach field. As wastewater enters the tank, the solids will settle to the bottom and the grease and oils will float to the top. A baffle separates the tank into two compartments which are set horizontally next to each other. This allows the grease and oils to be trapped in the first compartment. Most of the solid wastewater digestion occurs in the second compartment. Some of the solids get liquified but most settle out on the bottom of the tank where they remain until pumped. Detention time in a septic tank is usually between 12 to 24 hours and most settleable solids will remain in the tank. They must be pumped out and disposed of periodically to prevent the tank from filling. The solids in the bottom of the tank are anaerobically digested by microbiological organisms. These organisms are usually methane formers, bacteria, anaerobes and other septic fillamentaceous organisms.

A draw-off line approximately 6 inches from the top of the septic tank is distributed into an array of piping known as leach lines. The clear liquid or supernate of the wastewater is distributed into the soil leaching system. Conditions are not favorable for rapid gasification like an aerobic digester, so most of the waste stabilization will happen in the soil.

An effective evaluation of the operating efficiency of a septic tank should include a microbiological examination, as well as a mixed liquor suspended solids (MLSS) analysis and a mixed liquor volatile suspended solids (MLVSS) analysis in order to determine volatile organic reduction. The visual appearance of the tank is also very important in determining the health of the system.

Microscopic Examination

Sampling was performed by a technician from Alberts Water & Wastewater Services on April 1, 2003 and on April 10, 2003. Two 1000 ml samples were collected each time from the first chamber of the septic tank. During both samplings, it was noted that there was no grease or foaming on top of the tank. The mixed liquor was homogeneous in mixture with a light reddish color. No solids were noted in the bottom of the septic tank.

The sample was transported to the laboratory for microscopic examination within 20 minutes of collection. During the two micro exams, five slides were prepared. All slides contained bacteria, anaerobes, some spirillum, and what appeared to be flagellates. All slides were examined at 100, 200, 400, and under oil emersion of 1000 power.

RANK	ORGANISM	ABUNDANCE
	Bacteria	Abundant
2	Amoeba	Abundant
3	Anaerobes	Some
4	Spirillum	Some
5	Flagellate appearing organisms	Few to some

Laboratory Analysis

Lab analysis was provided by both Alberts Water & Wastewater Services and Colo Analytical Laboratory. The results are as follows:

MLSS - 242
MLVSS - 132
55% Volatile Solids Reduction
Total Dissolved Solids were not analyzed. If they had been included, the Suspended Solids figure would have been higher.

Total Suspended Solids - 265	Below normal
Biochemical Oxygen Demand - 1,086	Below normal
Ammonia Nitrogen - 71.20	Average
PH - 6.92	Average
Fecal Coliform - 10,000	Excessive
Total Coliform - 9,800,000	Excessive

Significance of Findings and Comments

It is my opinion that the septic tank has not been in operation very long as there was not a significant amount of solids in the bottom of the tank. No oils or grease were observed in the first compartment. The MLSS was diluted and the total solids reduction was low.

Lab personnel have provided information regarding two types of disinfectant that is being used to clean the lab, including MSDS sheets. The fecal coliform and total coliform numbers are excessive which leads me to the conclusion that the concentration of disinfectant flowing into the septic tank has not reduced the microbiological and coliform populations. It is my opinion, after reviewing the laboratory results and performing the micro exam, that the septic tank is operating in an efficient manner. I have based most of my conclusions on the presence of microbiology.

If you have any further concerns, please feel free to contact me.

Sincerely,

Robert R. Alberts, Principal
Alberts Water & Wastewater Services

Enclosure

cc: Laurie Baeten

Colorado Analytical Laboratories, Inc.

LABORATORY ANALYSIS REPORT

REPORT TO: ROBERT ALBERTS

LAB NO: 13434

DATE RCVD: 4/2/03

BILL TO: ALBERTS WATER/WASTEWATER
305 W. MAGNOLIA STREET, PMB# 275
FORT COLLINS, CO 80521

REPORTED: 4/10/03

PROJECT: DIVISION OF WILDLIFE

PO NO.: VERBAL

ANALYSIS REPORT

	DIVISION OF WILDLIFE SEPTIC 4/1/03 1200	METHOD REFERENCE
TOT. SUSPENDED SOLIDS (MG/L)	265	SM 2540-D
BOD-5 DAY 20c (MG/L)	1086	SM 5210-B
AMMONIA-NITROGEN (MG/L)	71.20	SM 4500-NH3-D
PH (UNITS)	6.92	SM 4500-H-B

MG/L = MILLIGRAMS PER LITER OR PPM

REFERENCES:

SM = "STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER"; APHA; 19th EDITION; 1995

ANALYSIS SUPERVISED BY

DATA APPROVED FOR RELEASE BY

240 South Main Street / Brighton, Colorado 80601-0507 / 303-659-2313
Mailing Address: P.O. Box 507 / Brighton, Colorado 80601-0507 / Fax: 303-659-2315

Colorado Analytical Laboratories, Inc.

LABORATORY ANALYSIS REPORT

REPORT TO: ROBERT ALBERTS

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DATE RCVD: 4/2/03

BILL TO: ALBERTS WATER/WASTEWATER
305 W. MAGNOLIA STREET, PMB# 275
FORT COLLINS, CO 80521

REPORTED: 4/10/03

PROJECT: DIVISION OF WILDLIFE

PO NO.: VERBAL

ANALYSIS REPORT:

	DIVISION OF WILDLIFE SEPTIC 4/1/03 1200	METHOD REFERENCE
FECAL COLIFORM (MPN/100MLS)	10,000	SM 9221-B
TOTAL COLIFORM (MPN/100MLS)	9,800,000	SM 9221-B

MPN/100mls = MOST PROBABLE NUMBER INDEX/100mls

REFERENCES:

SM = "STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER"; APHA; 19th EDITION; 1995

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Colorado Analytical
Laboratories, Inc.

CHAIN OF CUSTODY RECORD

COMPANY NAME: Alberts W&W	CONTACT PERSON: Bob Alberts
ADDRESS:	PROJECT ID / DESCRIPTION: Division of Wildlife
TELEPHONE:	SAMPLED BY: BA
FAX:	P.O. NO.:

Colorado Analytical Laboratories, Inc.
P.O. Drawer 507
240 South Main Street
Brighton, Colorado 80601
303-659-2313
FAX: 303-659-2315

LABORATORY USE ONLY

№ 012704

LAB # 13434

LOC

QC

DISP

DUE

Sample Matrix (Circle One):
WATER SOIL SLUDGE (WASTEWATER)
OTHER (Specify):

TESTS REQUESTED

DATE	TIME	CLIENT SAMPLE ID:	# OF CONTAINERS	GRAB (CHECK ONE ONLY)	COMPOSITE	RESIDUAL CHLORINE (MG/L) (DRINKING WATER ONLY)	BOD	Ammonia	Nitrate	pH	Total Coliform	Fecal Coliform		
		Division of Wildlife (Septic)	1	✓			✓	✓	✓	✓	✓	✓		

REPORT RESULTS TO CDH: Y or N (DRINKING WATER ONLY)

PUBLIC WATER SUPPLY INFOR:

PWSID:

SYS NAME:

ADDRESS:

CITY/STATE:

ZIP:

COUNTY:

COMMENTS:

DELIVERED BY:

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
M. Roe	4/2/03 4 pm		4/2/03 16:30				